fidelity to a great principle of acknowledged value. By such aids the whole surface of the earth might rapidly be changed, improved and beautified; and the air, the earth, and the water might be made to swarm with everything calculated to be useful, interesting and attractive. By aid of this principle of combination, not only my friends the nightingale and the skylark could be added to the birds of this colony within a year, but every other British singing bird, at the cost of a penny per head to each member of our present population.

Art. XII.—*On a Suggestion for a new Mode of Life Insurance.*

By Professor Wilson, M.A., Melbourne University.

[Read before the Institute 5th August, 1857.]

The object of this paper is to bring forward a suggestion for increasing the advantages offered by insurance offices. It does not propose any alteration in the present modes of insurance, but the addition of another to those already existing.

According to the most usual system of insurance, a person wishing to secure a certain sum of money, to be paid to his representatives at his death, contracts to make to the office annual payments called premiums, the amount of which depends on his age and state of health.

There are various subsidiary arrangements by which, in some instances, the successive premiums are gradually diminished, in some the amount insured is increased, and in some instances the payment of premiums ceases after a finite term of years. In some instances, to which I shall more particularly refer afterwards, the payment at death is secured by the payment of a single premium.

It not unfrequently happens that from one cause or another persons who have insured are unable to continue the payment of their premiums, and, to avoid forfeiture, are compelled to sell them, a process which always involves considerable loss.

The arrangement which I propose is as follows; and in stating it I will, in the first instance, waive all considerations arising from the necessity of guarding against fraud or unsound health.

Let a table be formed showing, for every age, the single pay-

ment equitably equivalent to £1 to be paid at death. In other words, a table of single premiums payable to insure £1.

On a person of any age making a payment into the office let him be credited with a sum, calculated from this table, as the equivalent payment to be made at death. And so for any other payments he may make at regular or irregular intervals.

If at any time he should wish to draw any sum of money from the office, let his account be charged with the corresponding sum, calculated from same table, as the equivalent payment at death.

The series of transactions will thus partake of the character of a deposit account at an ordinary bank, inasmuch as payments are made into the office, and drafts made against the amount standing to the insurer's credit in the office ; and it will partake of the character of an insurance, inasmuch as the whole of the accounts between the office and the insurer will have reference to one date, viz. the death of the insurer. There will be no calculation of interest, but the insurer will secure for his representatives, on any sum remaining till his death, the accumulation of interest corresponding to the average duration of life.

This system, so far as regards the payments made into the office, would differ little from the system of securing a policy by a single premium. The principle of each is the same. Since, however, it contemplates smaller and more frequent payments, it would be necessary for arrangements to be made for effecting these payments without the trouble and formality of taking out a fresh policy on every occasion.

The peculiarity consists in the proposal of one scale of prices according to which the office will either sell or purchase an insurance ; and by which, consequently, the depositer or insurer may know precisely the amount he is entitled at any time to draw without the necessity of making any bargain.

Since the idea of buying and selling according to the same scale of prices seems, at first sight, to leave nothing for expense of management and profit, it will be necessary for me to enter into a short calculation in order to show how this profit may be secured, while the buying and selling from one table is still adhered to.

Let, then A_n be the present value of an annuity of £1 a year to continue during the lifetime of a person (say John Styles), whose age next birthday will be n years, the first payment being due one year hence.

r the interest of £1 for one year.

Then, on a principle explained by De Morgan in the article

"Reversion," in the Penny Cyclopædia, the present value of £1 payable at the settling day next after the death of John Styles is

$$\frac{r}{1+r}\left(\frac{1}{r} - A_n\right) \text{ pounds.}$$

John Styles, therefore, on paying $\frac{r}{1+r}\left(\frac{1}{r} - A_n\right)$ into the office, will be credited with £1 payable to his representatives at his death.

After m years from this transaction, the present value of £1 payable at the death of John Styles, who will then be $n+m$ years old, will be

$$\frac{r}{1+r}\left(\frac{1}{r} - A_{n+m}\right)$$

and, in the event of John Styles wishing to draw the £1 standing to his credit as payable at his death, this is the sum to which he will be entitled.

This exceeds his original payment by

$$\frac{r}{1+r}\left(A_n - A_{n+m}\right)$$

which represents the profit he derives from the investment of his original deposit during m years.

The accumulation of interest on the original deposit during these m years, which will be obtained by the office, is

$$\frac{r}{1+r}\left(\frac{1}{r} - A_n\right)\left(\overline{1+r}\,|^{m} - 1\right)$$

and if from this we deduct the increase obtained by John Styles there remains to the office a balance of

$$\frac{\overline{1+r}\,|^{m} - 1}{1+r} - \frac{r}{1+r}\left(A_n\,\overline{1+r}\,|^{m} - A_{n+m}\right)$$

Now supposing that the tables of the duration of life adopted in calculating the value of A_n could be strictly depended on, and supposing also that the assumed rate of interest could always be obtained, and no higher rate, then this balance would exactly represent the risk of loss to the office during the m years which would accrue by the death of John Styles; and, if a sufficient

number of cases were taken, would exactly make up these losses, leaving no margin for expense of management, loss by bad investment of money, depreciation of interest, or profit.

With the view of supplying this margin, let $A_n\ (1-x)$ be used instead of A_n throughout the previous calculations, *i.e.*, let the accurately calculated present value of Annuities be all reduced in the ratio $1 : 1-x$ before they are used to form the table referred to; we shall then have the following sums corresponding to a policy of £1 payable at the death of John Styles:—

Original deposit $$\frac{r}{1+r}\left\{\frac{1}{r}-A_n\,(1-x)\right\}$$

Increase or profit on that deposit when withdrawn after m years $$\frac{r\,(1-x)}{1+r}\left(A_n-A_{n+m}\right)$$

True risk incurred by office $$\frac{\overline{1+r}\,|^{m}-1}{1+r}-\frac{r}{1+r}\left\{A_n\overline{1+r}\,|-A_{n+m}\right\}$$

as before, and

Margin to cover expense of management, profit, &c., $$\frac{r\,x}{1+r}\left\{A_n\,\overline{1+r}\,|^{m}-A_{n+m}\right\}$$

To this profit must be added any that may be derived from investing the money at a higher rate of interest than that assumed for the basis of the table.

The table which would be required is a table of the value of $$\frac{r}{1+r}\left\{\frac{1}{r}-A_n(1-x)\right\}$$

or all values of n.

The most obvious objection to the plan is the trouble arising from the necessity of a medical examination, which, since every deposit is, strictly speaking, the opening of a new policy, should precede every such deposit. I think, however, that sufficient security might be obtained for the office without this.

The object of the plan is to afford a ready, secure and highly unspeculative investment for savings, which furnishes a certain and easily calculable but small profit thereon, in case of withdrawal; and some of the security of a life insurance, in case of death.

It is not to be expected that any large sums would be so invested, because the return would be less than could be obtained in other ways, and would only be realised on withdrawing the capital.

It would, therefore, most probably be found sufficient security for the office if the insurer were required to undergo a strict medical examination before opening his account with the office, and if he were required to attend personally for the purpose of making each deposit, and to hold himself on all such occasions ready to submit to a further medical examination if it were thought necessary.

If this were the case any unusually large deposit would naturally excite suspicion, and the reception of the deposit would be deferred till after such examination. The medical adviser of the office would also, of course, be provided with a list of depositers, and would keep a general lookout as to any indication of disease.

It would also probably be necessary to require a notice of three or six months before the withdrawal of any large sum.

In conclusion, I wish to state that this suggestion is not to be judged of as one claiming to do great things, but merely as an additional convenience to those persons whose incomes are so fluctuating as to deter them from encumbering themselves with a regular life insurance, and who, at the same time, are desirous of investing their savings in a way as advantageously as possible for their relatives in case of their early death, yet in such a manner that they may readily realise them without loss in the event of their requiring them.

P.S.—Since reading the preceding Paper I have been informed by W. H. Archer, Esq., that the proposed system has been adopted by more than one office ; but I have not been furnished with the names of the offices or the details of their arrangements in time for press.

W. P. W.

Sept. 23, 1857.